



BW Technologies Limited – Survivor Inline Water Purification System

www.survivor4i.com

Device Information

The BW Technologies Limited Survivor Inline Water Purification System is an in-line filter device designed for use with commercial hydration packs. The in-line filter contains a filter cartridge identical in design to BW Technologies Survivor 4(i) and Aquapuretraveller. The filter cartridge is contained in a sturdy plastic housing with separate inlet and outlet for connecting to the drink tube of a hydration pack. The filter cartridge consists of an activated carbon block depth filter surrounded by a plastic “sleeve” containing iodine resin beads. The filter cartridge is 6.5 cm (L) x 4 cm (Dia). The outside of the filter cartridge is a 0.2 cm thick plastic “sleeve” which acts to provide coarse filtration and houses iodine resin beads in a 0.1 cm space between the plastic sleeve and the carbon block filter. The iodine resin beads are designed to provide disinfection through direct contact with microbial pathogens as well as releasing iodine into solution for additional disinfection. The interior of the filter cartridge contains a hollow-core, cylindrical activated carbon block depth filter with a 0.8 cm thick wall. The carbon block filter is rated a 2 µm pore size. After installing the in-line filter on the drink tube line (fittings are included with the filter), water flows radially from outside the filter cartridge through the plastic “sleeve”, the iodine resin beads, and finally through the carbon block filter into the hollow inside before exiting the filter housing. Before the first use, the filter must be flushed to remove carbon particle fines by spitting out the first few mouthfuls of water. BW Technologies strongly recommends that 2 chlorine tablets (i.e., aquatabs) be added to each 3L hydration pack refill to provide additional protection against microbial pathogens and keeping the hydration pack clean. When storing the device, BW Technologies recommends draining the in-line filter and washing the hydration pack prior to storage.

Effectiveness Against Microbial Pathogens

No data was received showing the effectiveness of this product with respect to the U.S. Environmental Protection Agency (USEPA) Guide Standard Protocol for Testing Microbiological Water Purifiers (reference 1). Independent data received (reference 2) that did not use the USEPA protocol and general knowledge of carbon block filtration and iodine disinfection indicate the device is capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts to the required minimum log reductions stated in reference 1 (i.e., 3-log) when used as directed. It is not expected to consistently reduce bacteria (6-log) and viruses (4-log) when used as directed. The iodine resin beads will provide some disinfection upon contact with a microorganism; however, the short contact time provided due to the radial flow of water through the device prevents the resin beads from being more effective. Unlike the

BW Technologies Survivor 4(i) and Aquapuretraveller which produce an iodine residual prior to filtering, the in-line filter will not provide a residual due to it's designed operation as an in-line filter. The directions strongly recommend the addition of chlorine tablets to a 3 L hydration pack prior to filtering. No recommended wait times are provided. This results in an approximate chlorine concentration of 3 mg/L. This will provide some reduction of viruses and bacteria. However, it is not expected to consistently provide 6-log bacteria and 4-log virus reduction in most water quality conditions such as higher turbidities and colder temperatures. Additional virus and bacteria reduction can be achieved by always adding a disinfectant such as chlorine, chlorine dioxide, or iodine to the hydration pack and waiting a period of time before use. Based on independent data not using the USEPA protocol and general knowledge of carbon block filtration and iodine disinfection, the BW Technologies Survivor Inline Water Purification System is assigned one √ for the reduction of *Giardia* cysts and *Cryptosporidium* oocysts and an X for bacteria and virus reduction (for an explanation of the rating checks [click here](#)).

Table. Expected Performance Against Microbial Pathogens When Used as Directed.

Microbial Pathogen Type	Expected Disinfection Capability	Evaluation Rating	Primary Pathogen Reduction Mechanism
Bacteria	> 6-log	X	size exclusion and disinfection
Viruses	> 4-log	X	disinfection
<i>Giardia</i> cysts	> 3-log	√	size exclusion
<i>Cryptosporidium</i> oocysts	> 3-log	√	size exclusion

Production Rate and Capacity

Inherent to the production rate and capacity of filtration devices is the quality of the raw water source. Because it is an in-line filter designed to be used with a hydration pack, the actual production rate is dependent on the user. The production capacity of the device is stated to be up to 350 L. However, production capacity will vary widely with raw water quality (i.e., turbidity).



Cleaning, Replacement, and End of Life Indicator

This device cannot be backwashed to remove sediment from the filter. When the device becomes unusable due to decreased production rate, the clogged filter cartridge must be replaced. For practical purposes, the filter cartridges are not cleanable. The device contains no end of life indicator short of filter clogging.

Weight and Size

Dry weight	100 grams
Size (height x diameter)	13.5 cm x 5.5 cm

Cost

The Survivor Inline Water Purification System is not sold at stores in the United States. The device is available through online ordering and at stores outside of the United States.

Survivor Inline Filter	\$50.00
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Device Evaluation

No data was received that challenged the Survivor Inline filter against reference 1. Independent data received that did not follow the reference 1 protocol and general research on carbon block filtration and iodine disinfection indicate this device should be capable of consistently reducing *Giardia* cysts and *Cryptosporidium* oocysts when used as directed. This device is not likely capable of consistently reducing bacteria and viruses when used as directed. Always adding a disinfectant to the hydration pack and waiting a period of time before consuming will help reduce bacteria and viruses prior to filtering. The activated carbon should remove tastes and odors in addition to iodine. This device, like all filters with small pore sizes, is highly affected by turbid (cloudy) waters. Since the device is not able to be backwashed to remove accumulated particulates, once clogged, the filter must be replaced. There is no indicator of process failure or end of device useful life. Although this device uses iodine, when used as directed it is not expected to cause any adverse health effects for healthy adults with no pre-existing thyroid condition or sensitivity to iodine. This device is not recommended for use by pregnant women (concern for fetus), people with known hypersensitivity to iodine, people with a history (or family history) of thyroid disease, and people from areas with chronic iodine deficiency (reference 3).



Advantages

- Expected to consistently provide adequate protection from *Giardia* cysts and *Cryptosporidium* oocysts, although device-specific testing data using the USEPA protocol is not available.
- Simple and effective.
- Provides taste and odor reduction.
- No adverse health effects expected in healthy adults with no iodine sensitivity.

Disadvantages

- Not expected to be consistently effective against bacteria and viruses.
- Reduced production capacity when using high turbidity water.
- Not backwashable.
- No real-time indicator of process failure.
- Not recommended for use by pregnant women or people with iodine sensitivity.

References

1. USEPA, 1989. Guide Standard and Protocol for Testing Microbiological Water Purifiers. *Federal Register*. 54:34067.
2. Independent laboratory data provided by BW Technologies, Ltd.
3. U.S. Army Center for Health Promotion and Preventive Medicine, 2005. *Technical Information Paper; Iodine in the Use of Individual Water Purification Devices*, Aberdeen Proving Ground, MD.

